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MOTTLED ENAMEL AND BROWN STAIN.

A CONDITION AFFECTING THE TEETH IN CERTAIN LOCALITIES.

By F. C. SMITH, Surgeon, United States Public Health Service.

This condition is confined to certain geographical areas, of which the following are known: The Salt River and the Gila Valleys in Arizona, the territory affected extending also into old Mexico; an important section in Colorado, including the city of Colorado Springs and rural districts above and below this city on Fountain Creek; small regions in Texas, Virginia, California, South Dakota, and South Carolina, respectively; and probably areas in Oregon, Washington, Idaho, Montana, Alaska, and near Port Henry on Lake Champlain.

It seems that the first mention of this condition was made by Surg. J. M. Eager, of the United States Public Health Service, his report, Denti di Chiaie (chiaie teeth), being published in the Public Health Reports November 1, 1901. Surg. Eager had observed the condition at Naples, Italy, and at Pozzuoli, a suburb of that place. While his descriptions differ somewhat from these of the Colorado State Dental Association recently published, it seems very probable that the condition occurring in the United States is identical with, although of a somewhat milder type than, that which Surg. Eager describes as occurring in Italy.

The study made for the Colorado State Dental Society, published by Dr. Frederick S. McKay and Dr. G. V. Black, of Colorado Springs, Colo., is a valuable contribution to science and is the only careful study of the condition to be found in the literature. Their collaborated articles were published in the Dental Cosmos, February, May, June, July, and August, 1916, under the following titles, respectively: "Mottled Teeth: An Endemic Developmental Imperfection of the Enamel of the Teeth Heretofore Unknown in the Literature of Dentistry." "An Investigation of Mottled Teeth: An Endemic Developmental Imperfection of the Enamel of the Teeth Heretofore Unknown in the Literature of Dentistry."

The following is a brief abstract of these articles:

In the endemic areas, mottled enamel and brown stain occur in the permanent teeth after their eruption, and are due to a defect in the formation of the enamel caused by the absence of cementing substance occurring normally between the enamel rods in the outer third of the enamel layer. The outer glazed enamel surface, Nasmyth's membrane, is however always normal. When there is a simple lack of the cementing substance, the portions affected contain only air and show through Nasmyth's membrane as a dead opaque white, but when deposits of coloring matter, called brownin by Dr. Black, occur, the teeth appear to be stained yellowish, brownish, or even black, in varying degrees according to the amount of the stain present in the spaces between the enamel rods. Dental caries is apparently not more frequent in teeth so affected, although repairs are made by the dentist with more difficulty when caries occurs.

The disease or defect occurs among all races in the endemic areas, Indians, Negroes, Mexicans, and native Americans being impartially affected. It occurs without distinction among those who have been breast fed and bottle fed, without regard to degree of physical robustness, and independently of the occurrence of diseases of childhood. Its occurrence appears not to be dependent upon the degree of personal hygiene observed. It is found among both the rich and the poor, and appears to be independent of the food supply. The concensus of opinion among observers is that it is due, in some unknown manner, to the drinking water. The relation of the water supply is not plain, since Drs. McKay and Black have found the condition among people consuming water low in mineral content derived from melting snows in the upper reaches of Fountain Creek and also among people consuming water high in mineral content in other places. Analyses of representative waters from the various areas follow.

Table of analyses of water from endemic districts (McKay).

[Given in parts per million.]

Constituents (ions.).	Mine water at V ——.	Lawson ranch well water.	Scholes's well.	Mine water at E ——.	Sigle ranch spring.	City water at L ——.
Sodium	276.77	207.80	242.70	37.12	11.05	3.20
Potassium	....	3.35	6.44	....		
Calcium	89.75	31.80	33.31	74.40	21.32	5.70
Magnesium	27.36	37.75	33.60	16.71	5.41	1.70
Iron	Nil.	....	3.35	Trace.	....	.49
Aluminum	2.74	....	....			
Chlorin	47.37	31.00	51.00	14.17	8.31	7.29
Sulphuric acid	651.49	142.40	250.00	104.66	46.80	7.10
Carbonic acid	216.78	615.00	530.00	239.60	22.80	15.30
Silicic acid	16.68	21.65	18.12	....	....	7.50

The condition, while it does not affect the general health of the people, is one to be not lightly regarded. The deformity once present persists throughout life, resisting all bleaching processes. It is so disfiguring that relief is frequently sought and resort sometimes had to the cutting away of the crowns of affected teeth and the substitution of artificial crowns therefor.

Since the defect results from exposure to the deleterious influence during the enamel-forming periods, it happens that children brought into the endemic area after infancy will show varying degrees of involvement according to the age at which exposure began; thus, if a child is first brought into the endemic area after the age of seven, the incisors, cuspids, and first molars escape injury; if after the age of eleven, the bicuspids and second molars also escape; and if after the age of fifteen, none of the teeth will show the defect even though the remainder of life is spent in the endemic region. Conversely, if a child is removed from an endemic focus at an early age, only portions of certain teeth may show the involvement in varying degrees, but such deformity as is acquired persists throughout life regardless of the subsequent place of residence.

The natural occurrence of the defect in the teeth of lower animals has not been observed. Its experimental production appears not to have been attempted. Nor has a careful chemical examination been made of brownin or other substance which may be responsible for the stain itself.

Dr. Joseph A. Murphy, medical superintendent, United States Indian Service, and Drs. C. E. Sims and F. E. Rodriguez, also of the Indian Service, are quoted in observations made on this mysterious affection. All seem of the opinion that it is due in some way to water, either to alkaline material or to ferruginous or sulphurous matters contained therein. Rodriguez states that "people living in the neighborhood of hot springs have the discoloration to the greatest extent." Eager makes a somewhat similar observation: "The etiology seems to be connected with volcanic fumes or the emanations of subterranean fires, either fouling the atmosphere or forming a solution in drinking water." It should be recalled, however, that the most extensive endemic areas yet described are in desert regions far from the neighborhood of active volcanoes. More than a casual interest in the influence of water has been taken by the writers, who call attention to the fact that, whereas the mine water at V ——— and the city water at L ———, described in the first and last columns, respectively, of the above table, are entirely different in their analyses, the endemic percentage was very high in both: Namely, 100 and 87½, respectively. Prof. Strieby, of Colorado Springs, is quoted in the belief that in future chemical examinations the "standard" analyses of waters should be abandoned and search made for traces of rarer elements which might be responsible.

Concluding, Black states: "Future work on this problem, then, must be in the more critical examination of the endemic areas already located, and the writer believes that with the collection and presentation of the mass of evidence in this article the subject has passed beyond the strictly dental realm, and must now be examined from the standpoint of some collateral branch of science. That the problem is a chemical one, there seems to be little doubt, but that it is also physiological is just as certain."

DESTROYING LICE ON TYPHUS FEVER SUSPECTS.

By S. B. GRUBBS, Surgeon, United States Public Health Service.

The importance of efficient and rapid methods of killing lice in clothing and on the human body is recognized by those charged with the exclusion of typhus fever from the United States. This disease, endemic in Mexico, requires energetic measures to prevent its spread northward, while the European War is so distributing it through southern Europe that renewed immigration may be expected to carry it across the Atlantic.

Studies that have been made during the past year at the Boston quarantine station, under the United States Public Health Service, have resulted in the adoption of a method of treating persons by means of a gasoline soap spray and shower bath and of treating clothing and baggage with a vacuum hydrocyanic acid gas process.

Equipment.—The bath house is an oblong building with a large steam chamber at one end, from which tracks extend the length of the building. A fence, with gate for the carriage from the steam chamber, has been built across the building, so that the only passage from one end of the building to the other is through a shower tank, 15 feet long. This tank is built of concrete, is 4 feet wide and holds 20 inches of water. At the entrance of the shower is a barrel with a spray pump with mechanical agitator. This pump, intended for spraying trees and plants, is especially adapted for emulsions, as it constantly agitates the solution. It operates by means of a pump handle and delivers with considerable force a fine or coarse spray as desired. Many soap combinations have been tried, all based on the kerosene emulsion spray used for plant lice and other insects. Gasoline has been substituted for kerosene, as reports from the English army in the trenches state that this was found to be a better remedy for lice. The formula adopted incorporates as much gasoline as possible without preventing the soap from lathering freely. For this the stock is made as follows:

Soap chips or laundry soap	Part 1.
Soft water	Parts 4.
Gasoline	Parts 4.

Dissolve the soap by boiling in the water, remove from the fire and add the gasoline. Stir the mixture until it becomes a creamy mass of even texture without signs of either gasoline or soap. This hardens in a few hours to the consistency of stiff jelly.

For spraying, this stock is mixed with five to ten parts of hot water and used while warm in order to lessen the chilling effects of the spray on the body.